

Appendix A: WATER RESOURCES OVERVIEW AND RECOMMENDATIONS FOR EBHEY'S LANDING NATIONAL HISTORICAL RESERVE

Description and Overview of Water Resources

Ebhey's Landing National Historical Reserve (EBLA) is a National Park Service-affiliated unit located on Whidbey Island in northwestern Washington. The unit is administered by the 9-member Ebhey's Landing National Historical Reserve Trust Board which includes representatives from Island County, the Town of Coupeville, Washington State Parks, and the National Park Service. The Trust Board is responsible for the implementation of the Comprehensive Plan for the Reserve, which provides for the protection of historic and natural features of the National Historical Reserve through existing state and local zoning, land use controls, acquisition of scenic easements and other cooperative management arrangements rather than extensive land acquisition.

The 17,400 acres of landscape included within the reserve has previously been divided into ten distinct character areas, each typifying a different cultural or natural resource character (Gilbert, 1985). These include Penn Cove, the San de Fuca Uplands, Coupeville, East Woodlands, West Woodlands, Smith Prairie, Ebhey's Prairie, Fort Casey Uplands, Crockett Prairie and the Coastal Strip (Figure 1). In order to maintain consistency, these same ten character areas will be referenced in the following water resource assessment.

While a relatively small area, EBLA does contain a relatively broad diversity of marine and freshwater resources. Bounded on east by the Saratoga Passage (Puget Sound) and on the west by the Admiralty Inlet (between the Strait of Juan de Fuca and Puget Sound), the National Historical Reserve contains extensive marine resource areas including Penn Cove, Kennedy's Lagoon, and Grasser's Lagoon in the northeast, Admiralty Inlet and Perego's Lake (lagoon) to the west and Admiralty Bay and Crockett Lake (lagoon) in the south.

These areas provide habitat and nursery grounds for marine invertebrates and fish (Grasser's Lagoon, Kennedy's Lagoon, Crockett Lake), support important commercial fisheries (Penn Cove), provide wildlife habitat for waterfowl and terrestrial animals (Penn Cove, Crockett Lake, Perego's Lake) as well as providing extensive recreational activities including boating (Penn Cove, Admiralty Inlet, and Admiralty Bay), bird & whale watching, swimming (Penn Cove), and scuba diving (Admiralty Bay).

Surface freshwater resources within the National Historical Reserve are more limited. However, surface water resources do include a kettle pond (Lake Pondilla) located in a formally glaciated kettle pond area of the West Woodlands and several small wetland areas which include kettle holes (West Woodlands), a freshwater wetland near the Prairie Center School (Coupeville) and human-impacted salt marsh areas on the northern side of Crockett Lake (Crockett Prairie).

An initial discussion of water resource issues and management concerns at EBLA identified the following concerns: 1) possible water quality and marine resource impacts in Penn Cove, 2) identifying (if any) recommended management actions for protecting kettle pond/kettle hole resources, 3) identifying (if any) recommended management actions for protecting Perego's Lake, 4) Crockett Lake water level issues, 5) groundwater quantity and quality issues, 6) wetlands identification and delineation, and 7) coastal development issues. Each of these issues will be addressed below.

1- Penn Cove (including Kennedy's Lagoon and Grasser's Lagoon)

Penn Cove is the predominant surface water feature located within EBLA. It is an appendage of eastern Puget Sound which runs in an east-west direction for a length of approximately 5 miles from the Saratoga Passage. The cove consists of approximately 4300 acres of water bordered by a 10 mile shoreline which varies from high sandy cliffs to muddy tidelands. Kennedy's and Grasser's Lagoons are located at the western end of Penn Cove. While small in size, these lagoons are highly productive biological systems.

Penn Cove is located in such a manner as to be significantly impacted by three major mainland rivers: the Snohomish, the Skagit, and the Stillaguamish. Because of this freshwater impact, salinities may vary greatly with both season and with depth. Gallucci (1980) reports that during periods of heavy freshwater inflow (mainly during spring snowmelt) the cove may stratify, with surface salinities as low as 15 parts per thousand (ppt), overlaying bottom waters with salinities of approximately 34 ppt.

Penn Cove supports extensive commercial and recreational fisheries as well as providing important recreational opportunities for boating, clamming, wildlife observation, and swimming. The high quality waters of Penn Cove are used by the commercial aquaculture industry for the production of locally-renowned Penn Cove mussels. In addition, Penn Cove supports a groundfish sport fishery of unknown magnitude and is the site of a significant recreational fishery for surf smelt, which spawn in the intertidal areas of Penn Cove from May 15 through October 15 (Island County, 1980a). In past years, Penn Cove was heavily utilized for commercial bottom fishing. However, the use of otter trawls for commercial bottom fishing in Penn Cove has recently been eliminated by the Washington State Department of Fisheries.

Penn Cove contains a considerable amount of public-owned beach providing access for swimming and hardshell clamming. A popular swimming beach is located at Monroe's Landing on the north shore of Penn Cove.

There are two permitted effluent discharges into Penn Cove. The Town of Coupeville and Penn Cove Park discharge sewage effluent after treatment into central Penn Cove. Both of these systems are reported to have experienced operational problems in the past (Addison, 1981). Because of these problems, and the relatively close proximity of these discharges to the public beach at Monroe's Landing institution of bacterial monitoring for recreational water quality at designated swimming beaches is warranted.

In the late 1970s, a group known as Penn Cove Associates unsuccessfully applied for the permits necessary to construct a 300-slip marina in Grasser's Lagoon, a shallow tidal lagoon located at the northwest extremity of Penn Cove. In assessing this request, the US Fish and Wildlife Service summarized the biological significance of Grasser's Lagoon as follows:

- 1- a viable salt marsh exists in the upper intertidal area of the lagoon that provides ideal habitat for waterfowl;
- 2- the rocky sandspit forming the outer boundary of the lagoon supports significant numbers of shorebirds, including high concentrations of turnstones, surfbirds, and rock sandpipers which are normally found in comparable numbers only on jetties and offshore rocks of the open coast;
- 3- the shallow waters of the lagoon are used by a number of fish species including juvenile chum, pink and coho salmon, herring, smelt, and flounder;
- 4- the abundance of shellfish and finfish in the area of the

lagoon and immediately adjoining waters of Penn Cove support high numbers of diving ducks, mergansers, and herons feeding in the area (US Fish & Wildlife Service, 1977).

The US Fish and Wildlife Service summarized by stating that Grasser's Lagoon "may be the most biologically productive area in Penn Cove from both a fish and wildlife standpoint" (US Fish & Wildlife Service, 1977). Based upon this and additional assessments by the Washington State Department of Ecology, the U.S. Environmental Protection Agency, the National Oceanographic and Atmospheric Administration, and Island County, the U.S. Army Corps of Engineers denied the permits that would have allowed for the construction of this marina project.

The close proximity of Route 20, the major north-south route on Whidbey Island, to Grasser's Lagoon and the northwest corner of Penn Cove presents a special concern. An accidental oil or hazardous materials spill from a truck along Route 20 into these waters or a spill from marine traffic in the Saratoga Passage could have serious consequences. Thus, the representation of the Trust Board on the US Coast Guard's Oil Spill Contingency Area Committee and the preparation of an Oil Spill/Hazardous Materials Spill Contingency Plan with a special focus upon the protection of these waters is strongly recommended.

2- Kettle Ponds (Lake Pondilla)

The West Woodlands Character Area is a topographically diverse area containing the highest ridges and deepest depressions (kettles) within the National Historical Reserve (Gilbert, 1985). This is the only area of "kettles", which formed as huge chunks of ice melted during the last glaciation, found on Whidbey Island. The West Woodlands Character Area is densely forested and remote, and reflects the interesting geological history of the National Historical Reserve.

While many "kettles" remain within the area, Lake Pondilla, located partially within Fort Ebey State Park, is the only extant kettle pond. No information was recovered regarding water quality or biota associated with this interesting feature. However, research in other parts of the United States have shown that kettle ponds are often sensitive ecosystems that can be deleteriously impacted by human inputs such as septic leachate. While development around Lake Pondilla is not intense, information needs to be gathered regarding the septic systems in the immediate vicinity and recommendations for kettle pond protection developed.

3- Perego's Lake

Perego's Lake is a coastal lagoon located on a narrow coastal strip south of Point Partridge and north of Ebey's landing on the eastern shore of Admiralty Inlet. The lake is approximately 0.6 mile in length and generally about 0.1 mile wide. It is separated from Admiralty Inlet by a narrow (100-150 feet (ft) wide) beach made up of sand, gravel, and cobble. The coastal strip appears to be subjected to moderate wave action (0.5-2 ft) and is strongly influenced by long shore currents that deposit eroded upland sediments in this vicinity (Gallucci, 1980). Slope changes abruptly inland of the lake with a cliff-face of approximately 240 ft rising almost immediately behind the lake.

No information was found concerning the hydrography or biological productivity of Perego's Lake. Such a study would provide important background resource information and might provide an excellent Master's

thesis topic for a student at a local university. The Trust Board may wish to contact local universities in order to encourage such a study.

4- Crockett Lake

The management of Crockett Lake is an important issue in the reserve because it is the largest inland water feature, an important element of the historic scene, and it was once apparently a very productive wildlife resource. Over the last half century Crockett Lake has been the focus of several efforts to drain it, resulting in several lawsuits and a great deal of interest by many parties, including the National Park Service. Its complex history is summarized below and some recommendations for future involvement are offered.

When early settlers arrived in the area, Crockett Lake was a large tidal lagoon, separated from Admiralty Bay by an 800 foot wide sandy bar called Keystone Spit. At time of settlement, Crockett Lake probably covered about 600 acres when full. Mudflats around its margins were regularly exposed and inundated as the water level changed in regular tidal and seasonal cycles. The lake was surrounded by tidal salt marsh, and some brackish and freshwater marsh in areas where groundwater discharged into the lake. Though the amount of water exchange between the lake and Admiralty Bay varied with seasonal tides and the changing morphology of the channel, it very likely had a regular flushing of seawater at all higher tides. Minor changes in salinity may have occurred due to winter floods or low tides and evaporation in the summer, but these were probably very minor compared to what occurs today.

Tidal gates were installed in 1948 by Island County Drainage District No. 6 in an effort to drain Crockett Lake and some of the marshlands surrounding it. The gates worked by allowing water to flow out of the lake at low tide, then blocking the return flow at high tide with automatic flapper valves. This reduced the lake to about 10 acres in size in 1953. Draining the lake combined with drainage ditches into the marshes was apparently successful and allowed agriculture to expand into the former marshlands. In 1974, the flapper valves rusted off of the gate and again allowed water to flow into the lake, though the rate of flow was restricted by the piping system at the gate. The drainage district was no longer active so the valves remained open and the lake grew to about 750 acres by the spring of 1982.

While the inundation of agricultural lands was no longer a problem as the lands around the lake were no longer cultivated, other problems did occur. Water overflowed SR-20 during one storm in 1982, though there is some speculation that inadequate or plugged culverts under the road were the major cause. A well, located east of Crockett Lake was overflowed and contaminated, and the drain fields for several residences in the Telaker Shores subdivision on Keystone Spit were flooded. Flooding in the drain fields was apparently a problem several years earlier as the residents were under a 1975 court order to correct the problem.

Some residents of Telaker Shores reactivated the drainage district and installed new flapper valves on the gates in April 1982. They did not get state or county permits claiming this was only a maintenance activity on an existing structure. As the lake level dropped, Seattle Pacific University (SPU) filed suit citing, among other things, that lower lake levels would impair the ability of EBLA to interpret the historic scene. SPU had established boat docks at the west end of the lake which were rendered useless by the falling water levels. SPU dropped the suit after meeting with the drainage district and agreeing to study alternatives and work toward an agreeable resolution.

There was apparently no action by the district during the following year. SPU brought suit again on March 21, 1985, claiming injury and, among other

things, that all of the commissioners of the district own or owned property under the lake, that they took action without environmental compliance or public notification, and that the district did not comply with the stipulations of the dismissal of the previous suit. SPU called for the preparation of a full Environmental Impact Statement under state law. The National Park Service had identified the natural values of Crockett Lake in its Comprehensive Plan and included plans for an interpretive center along Keystone Spit. Unit manager Reed Jarvis said in an affidavit, that reducing the lake to □ its former size would reduce and impair the scenic, historical and natural values and would adversely affect the preservation and protection of the lake environment.

In 1986, the drainage district contracted with Entranco Engineers to evaluate some of the management alternatives that had been agreed to when the first suit was dropped. They did not, however, examine installation of district wide water and sewer systems. The report discussed hydrologic conditions, but their measurements and evaluation were based on numerous assumptions and were conducted when the lake level was low and received no direct exchange with the bay. Water levels were modeled under several operating regimes. Entranco felt it was necessary to keep water levels below 4 to 5 feet above MLLW (Mean Lower Low Water) in order to protect septic systems at Telaker Shores. Lower levels were predicted to be better for wildlife because more mudflat would be exposed for feeding. The report neglected to mention that without regular inundation, the benthic organisms in the mudflat would quickly die.

An injunction was issued in 1987 to close the tide gates pending a trial. The district proposed long term levels between 2 and 3 feet MLLW. SPU suggested the National Park Service join them in a suit to require a full Environmental Impact Statement. The National Park Service did not join the suit but acknowledged that restoration to natural conditions would not occur with the proposed water levels, and requested that the drainage district establish a water level that would provide spring and fall mudflat habitats, support wildlife and minimize the loss of scenic values.

Based on a report by Roehl (1987), the drainage district requested a "Determination of Non-Significance" for water level management of Crockett Lake. The National Park Service issued a protest stating that its previous concerns had not been addressed. At the same time, the Washington State Department of Wildlife provided comments, advocating the maintenance of as near natural conditions as possible. Island County Planning advised the drainage district on August 3, 1987 that their analysis was inadequate for a "Determination of Non-Significance". The drainage district stated that they would be willing to complete an Environmental Impact Statement but did not have adequate funding to pay for it. Seattle Pacific University did not concur with the drainage district's and set terms for a settlement which included installing a separate drainage system for Telaker Shores (independent of Crockett Lake and draining directly into the bay), and cooperation with SPU, the Washington State Department of Ecology (DOE) and the Washington State Division of Wildlife in order to develop an operating plan. In the interim, SPU stated that they would accept the Washington State Division of Wildlife lake level recommendation for interim management.

On December 1, 1987 Washington State Department of Ecology offered to set lake levels. In January, 1988 Island County Drainage District No. 6 sought approval from the county to dissolve, and turn management of the lake over to the Washington State Department of Ecology. The drainage district, however, was not dissolved, but agreed to operate the gates to achieve the Washington State Division of Wildlife recommended lake levels.

Recently the drainage district has agreed to allow staff from Fort Casey State Park to operate the gates and manage water levels.

In 1989 or 1990 mosquitos became a problem and lake water management operations were blamed. In 1992, the infestation was so severe that several local citizens began operating the gates to lower lake levels. They also initiated a program of biological and chemical control for the mosquitos, with state approval. The university, state agencies and Audobon Society have recognized the mosquito problem and not objected to lowering the lake.

Observations during our field visit indicated that the partially drained lake was unsightly, not very productive for wildlife except in the marshes, and offered little in the way of recreation opportunities. In our opinion, the productivity and scenic value of Crockett Lake have been greatly reduced by the manipulation of lake levels. There is little or no chance that the former productivity can be restored under any of the lower water level options being discussed. Removing the tide gates entirely is unlikely in the current situation, but it should not be eliminated as a long term goal.

In the interim, the National Park Service concerns for the management of Crockett Lake, closely parallel those of the Washington State Division of Wildlife and the Washington State Department of Ecology. It is recommended that the Trust Board work cooperatively with these entities to achieve reasonable management of Crockett Lake. If there is a need for further study, it is for examining how to achieve as near natural conditions and appearances as possible under the altered lake levels. Such a study should examine the appropriate pattern of lake level fluctuation, the amount of sea water mixing that is necessary to maintain healthy marshes and mudflats, and the potential for establishing tidal marsh vegetation on the portions of the mudflats that will no longer be inundated.

5- Groundwater Quantity and Quality Issues

Residents of Whidbey island in and around EBLA are entirely dependent on groundwater for domestic water and irrigation. The only surface water used in the general vicinity of EBLA is water piped from the Skagit River on the mainland to Oak Harbor. Groundwater pumping exceeds recharge in the vicinity of EBLA causing saltwater intrusion in some areas. Obtaining water supplies will be a continuing problem for the island's residents and for any facilities developed by the Trust Board.

Precipitation and its contribution to groundwater recharge is less than might be expected in central Whidbey Island. Due to the rainshadow effects of the Olympic Range, average precipitation is only about 18" per year in the vicinity of Coupeville. Some of the glacial soils have low surface permeability (causing much of the precipitation to runoff during storms) or hardpans that generally retard percolation into the groundwater. Soils in central portions of the reserve, from Prairie Center to Ebey's Prairie to Crockett Lake have low or very low permeability. Much higher permeability is found in the area of the western woodlands and Smith Prairie.

Saltwater intrusion is a serious problem. As pumping exceeds the rate of recharge, saltwater can move into the aquifer. Once contaminated, an aquifer can remain salty for a long time, even if no pumping occurs.

The groundwater shortage in the area is recognized. The groundwater aquifer on Whidbey Island has been designated as a "sole source aquifer" since the entire island (with the exception of water piped to Oak harbor) relies on this aquifer for its drinking water supply. This designation provides the aquifer with the state of Washington's highest level of regulatory protection.

One restriction mandated by the "sole source aquifer" designation is that no

landfills can be located on the island. An existing landfill east of Prairie Center is being converted to a transfer station so that all refuse can be trucked off of the island for disposal. Another regulation provides that the state will not grant water rights for any well that shows evidence of salt water intrusion. The Washington State Department of Ecology requires a demonstrated supply of at least 850 gpd before land can be subdivided.

The Town of Coupeville has issued a moratorium on new water hookups within the town limits. Coupeville obtains its water from an infiltration gallery on the old military reservation east of Crockett Lake. There are also three wells in town. One well, located within the center of town, provides good water and is used to meet peak demands. Two other wells in town provide poorer quality water, very high in iron, manganese, and hardness. The water from these wells receives reverse osmosis treatment and must be mixed with higher quality water in order to meet drinking water standards.

The Town of Coupeville maintains a reservoir with a capacity is 500,000 gallons, but only 160,000 gallons can be utilized as an effective water supply. The Coupeville water system delivers peak flows of 360 gpm. In addition to serving the Town of Coupeville, the water system serves Ft. Casey State Park, Camp Casey, several residences near the transmission lines, and unincorporated areas west to Kennedy Lagoon. Presently, the Town of Coupeville water system has a total of 670 hookups serving about 2,500 people. All other users in the reserve get water from individual wells or much smaller systems such as the Crockett Lake Water District with 115 service hookups, and Penn Cove Water District with 161 service hookups.

In an effort to obtain more water, the Town of Coupeville drilled a 400 foot deep well near the school. The water was high in chloride, indicating it is susceptible to salt water intrusion. Thus, the state refused to grant a water right for the well. Another option for increased water supplies is to pipe Skagit River water from Oak Harbor, but that will cost \$3.5 - \$4 million to install the pipe. Future plans call for drilling several wells near Smith Prairie, an area identified as having the greatest groundwater recharge potential.

Groundwater quality on Whidbey Island is poorest in the vicinity of the National Historical Reserve. Groundwater in this area is very hard, with specific conductances varying from 250 to 1240 umhos, and commonly exceeding 500 umhos. Dissolved solids, salinity and iron also exceed EPA drinking water standards in some wells, and one Town of Coupeville municipal well has high levels of manganese. Some new homes are putting in single home reverse osmosis systems to deal with poor quality water.

This critical shortage in water supply might affect the management of EBLA in two ways, obtaining water for new facilities, and through changing land use patterns. The identification of a potable water source should be a major concern when planning for visitor facilities. Water supplies should be assured prior to investing much effort and expense in other elements of planning and design. Water availability and saltwater intrusion could change land use patterns by forcing farmers out of business when water becomes too difficult or expensive to obtain. If a farmer's well dries up or becomes too saline, it may not be possible to drill a new well with water quality sufficient for the state to grant a water right. The only alternatives would be to purchase water from the Town of Coupeville municipal supply, which would be too expensive, or to convert the land to a less water intensive use. There is a high level of interest among local citizens and governments to conserve the existing water supply. The National Historical Reserve's involvement should include monitoring the situation and supporting prudent water and land use management that will allow historic uses to continue.

6- Wetlands Identification & Delineation

The most extensive wetlands in EBLA occur in the "kettle" area, around Crockett Lake, and in Prairie Center. According to the county, several other smaller wetlands have been identified in reserve, but we did not observe these, or see them on maps. The county has two generations of wetland maps, the National Wetlands Inventory maps from the 1970's, and some improved maps from the mid 1980's. They have found neither of these to be comprehensive and rely on finding hydric soils on the soil survey, and on individual site visits to identify wetlands.

The county manages wetlands as sensitive resources through a zoning overlay system. Wetlands are mapped and classified as coastal or upland. There is also a classification for man-made wetlands, which are not regulated. Any activity located in a regulated wetland or its setback, the width of which varies with the wetland classification, requires a county permit. All permit requests inside of EBLA are sent to the Trust Board for comment. The county wetlands protection system is independent of, and probably provided a greater degree of protection than, 404 permitting by the Corps of Engineers.

Beyond active participation with the county in wetlands management, we do not foresee a need for further action in this area.

7- Coastal Development

Ebey's Landing National Historical Reserve contains approximately 25 miles of shoreline along the Penn Cove, Admiralty Inlet, and Admiralty Bay areas of Puget Sound. A series of recommendations pertaining to shoreline protection and management were made to Island County in 1980 (Island County, 1980b). The objective of these recommendations was to provide elements for an eventual Shoreline Management Master Program designed to maintain natural and cultural integrity within a 200 foot wide band upland of the shoreline. Many of the recommendations made in this report relate directly to the protection of water-related resources. It is suggested that the 1980 recommendations be reviewed and progress towards providing adequate shoreline protection be evaluated.

Recommendations

Ebey's Landing National Historical Preserve contains a wide variety of water-related resources. While background information is available for some of these resources, it is almost entirely lacking for others. Furthermore, several of the water resource issues (such as Crockett Lake water level management) are both complex and controversial.

It is the recommendation of the Water Resources Division that a Water Resources Scoping Report be prepared for Ebey's Landing National Historical Preserve. The Scoping Report would assist Trust Board members by: 1) identifying and discussing a number of water resources-related issues, 2) providing an overview of existing hydrological information relating to these issues, and 3) recommending a course of action for addressing the major issues.

A Water Resources Scoping Report is developed cooperatively by the unit, the region, and the Water Resources Division. Requests for technical assistance from the Water Resources Division for the development of the Water Resources Scoping Report should be made through Shirley Clark, Regional Water Resources Coordinator.

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